Notes on the lifecycle of *Melitaea arduinna* (Esper, 1783) ("Freyer's Fritillary") (Lepidoptera: Nymphalidae) with further records from SE Serbia

Martin Gascoigne-Pees, Rudi Verovnik, Colin Wiskin, Christopher Luckens and Milan Đurić

Martin Gascoigne-Pees, 2 Barretts Close, Stonesfield, Oxfordshire OX29 8PW, U.K.; martin_g_p@hotmail.com
Dr. Rudi Verovnik, University of Ljubljana, Biotechnical Faculty, Department of Biology, Večna pot 111, 1000 Ljubljana, Slovenia; rudi.verovnik@bf.uni-lj.si
Colin Wiskin, 3 Coleson Hill Road, Wrecclesham, Farnham, Surrey GU10 4QQ, U.K.; colinwiskin@hotmail.co.uk
Christopher Luckens, Springfield, Goatham Lane, Broadoak, Brede, East Sussex TN31 6EY, U.K.; cjluckens@hotmail.co.uk
Milan Đurić, Bul. oslobodjenja 106/34, 11000 Beograd, Serbia; milan@habiprot.org.rs

Abstract: *Melitaea arduinna* (Esper, 1783) ("Freyer's Fritillary") was long considered as extremely rare and local at the western edge of its distribution in the Balkan Peninsula. It was only recently discovered in Serbia, where it is now reported from several localities. Although its life cycle has previously been described, there is no published photographic account of larval development. We provide additional records for the species in SE Serbia and present images of life cycle development from post-hibernating larva to adult. In Serbia larvae were found feeding on *Centaurea phrygia,* but in captivity larvae accept a wide variety of *Centaurea* species (Asteraceae).

Anmerkungen zum Lebenszyklus von *Melitaea arduinna* (Esper, 1783) (Lepidoptera: Nymphalidae) mit neuen Nachweisen aus Südostserbien

Zusammenfassung: *Melitaea arduinna* (Esper, 1783) wurde lange als extrem selten und lokal in seinem westlichen Randbereich der Verbreitung auf der Balkanhalbinsel angesehen. Die Art wurde erst vor wenigen Jahren in Serbien entdeckt und dort inzwischen an mehreren Fundorten nachgewiesen. Obwohl der Lebenszyklus kürzlich beschrieben wurde, fehlte noch die fotografische Darstellung der Präimaginalstadien. Im vorliegenden Beitrag präsentieren wir weitere Funddaten aus Südostserbien und eine fotografische Dokumentation der Jugendstadien. In Serbien finden sich die Raupen im Freiland an *Centaurea phrygia,* aber in Gefangenschaft akzeptieren sie eine breite Vielfalt von *Centaurea*-Arten.

Introduction

The lifecycle of *Melitaea arduinna* (Esper, 1783) ("Freyer's Fritillary") was first described by Wiltshire (1952) who cites *Centaurea behen* L. (Asteraceae) as the larval host plant. *Centaurea nemecii* Náb. is mentioned as a potential host plant in Turkey (Hesselbarth et al. 1995). There is also a brief description of the lifecycle in the Collins field guide by Tolman & Lewington (2008) indicating the possible utilization of *Centaurea graeca* Griseb. as a host plant. Ova are laid in large batches on the undersides of the leaves of the host plant. The post-hibernating larvae resemble *Euphydryas aurinia* (Rottemburg, 1775) and the adult larvae bear a superficial resemblance to those of *Melitaea phoebe occitanica* (Staudinger, 1871) (all Nymphalidae).

The range of *Melitaea arduinna* is extensive, covering parts of the Balkan Peninsula, Turkey, Iran, eastern Ukraine, southern Russia and extends towards central Asia (Tshikolovets 2003, Tolman & Lewington 2008). In the Balkan Peninsula it is known from northern Greece (Pamperis 2009), several localities in the Republic of Macedonia (Schaider & Jakšić 1989, Verovnik et al. 2010), Bulgaria (Abadijev 2001) and Romania (Székely 2008). It was only recently discovered in the eastern part of Serbia (Jakšić & Grozdanović 2007) in proximity to the most westerly locality in Bulgaria at Vrška Čuka (Abadijev 2001). In the last three years extensive surveys of this region were carried out and the species is now reported from twenty sites extending from Mt. Deli Jovani near Bor in the north to Mt. Suva Planina (Popović & Đurić 2010) in the south (see map, Fig. 1).

The habitat of the species in Serbia is defined as mesophilous meadows in beech or oak woods (Jakšić & Grozdanović 2007) or as sheltered woodland clearings and humid gorges (Popović & Đurić 2010). Its habitat at Jelašnica (Đurić et al. 2010) is a thermophilous limestone gorge. Dry calcareous gullies with steppe character are also considered to be a preferable habitat of the species in Romania (Székely 2008).

During 2010 and 2011 the authors visited the region of Stara Planina on several occasions with the aim of obtaining egg batches of this poorly known species for rearing. The objective of the study is to provide an account of the species' life cycle, a description of its habitat, and show and describe variability in adult's wing markings. We also add new records that indicate that the western fringes of the Stara Planina Mts. are one of the strongholds for this species in Serbia and the Balkan Peninsula.

Field observations

Two authors (RV & MĐ) visited the Stara Planina region in early vii. 2010. Adults of *M. arduinna* were found at several sites and in various habitats ranging from overgrown dry grassland to mountainous humid meadows. Adults were seen nectaring on Danewort (*Sambucus ebulus* L.) on a road verge at the edge of Kalna town in a seemingly unsuitable habitat composed mainly of regularly mowed and fertilised meadows.

Three of the authors (MG-P, CW, CL) accompanied by Duncan Trew and Charles Derry visited the Stara Planina region of SE Serbia between April 30. iv. and 7. v. 2011. Larval webs of *M. arduinna* were found in several localities. The first web was discovered on 1. v. in damp conditions on an un-improved but heavily grazed, NE facing hillside, approximately 1.5 km northwest of Cerova (Fig. 2). This small web was very close to the ground.

© Entomologischer Verein Apollo e. V., Frankfurt am Main

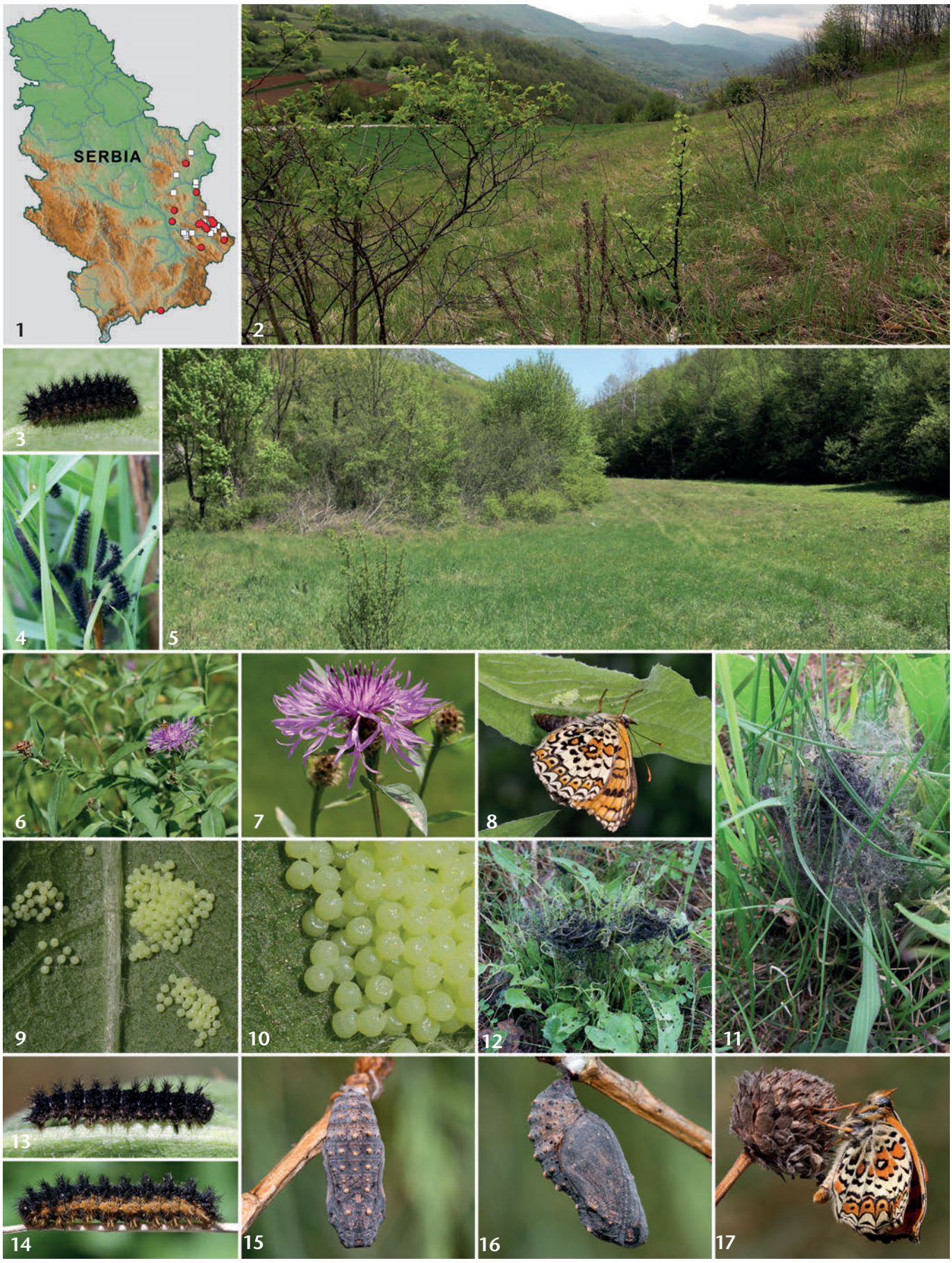

Fig. 1: Distribution of *Melitaea arduinna* in Serbia. Red dots represent new records; white squares denote published records up until 2011. — *M. arduinna* from Serbia, Stara Planina region. **Fig. 2:** Habitat 1.5 km NW Cerova, Serbia, 1. v. 2011. **Fig. 3:** Larva, 9 mm in length, 9. v. 2011. **Fig. 4:** Post-hibernating larvae, 3. v. 2011. **Fig. 5:** Habitat 7 km S Kalna, Serbia, 7. v. 2011. **Figs. 6–7**: *Centaurea phrygia*, larval host plant. **Fig. 8:** Adult ♀ ovipositing on *Centaurea phrygia,* 18. VI. 2011. **Figs. 9–10:** Ova batch laid on *Centaurea phrygia,* 20. VI. 2011. **Figs. 11–12:** Larval webs on *Centaurea phrygia,* 3. v. 2011. **Fig. 13:** Larva, 17 mm in length, 9. v. 2011. **Fig. 14:** Larva, 30 mm in length, 12. v. 2011. **Figs. 15–16:** Pupa, 20. v. 2011. **Fig. 17:** Adult ♂ inflating its wings, 31. v. 2011.

© Entomologischer Verein Apollo e. V., Frankfurt am Main

Melitaea arduinna from Serbia, Stara Planina region. **Figs. 18–19:** Adult ♂, ex ovo, 31. v. 2011. **Figs. 20–21:** Adult ♀, ex ovo, 7. vi. 2011. **Figs. 22–25:** Adult set specimens; **a** = upperside, **b** = underside. **Fig. 22:** ♂, ex ovo, 29. v. 2011. **Fig. 23:** ♂, ex ovo, 6. vi. 2011. **Fig. 24:** ♀, ex ovo, 10. vi. 2011. **Fig. 25:** ♀, ex ovo, 14. vi. 2011. **Fig. 26:** ♂ & ♀ in copula, 4. vii. 2011. — Photographs by M. Gascoigne-Pees. All specimens to be donated to the Oxford University (Hope Department), Entomological collections, at Parks Road, Oxford OX1 3PW, U.K.

The larvae were only just emerging from hibernation and judging by their size were in their 3rd instar. Fresh frass was observed beneath the new leaves of what appeared to be a species of *Centaurea*. The larvae were black with small grey speckles covering each segment, resembling post-hibernating larvae of *E. aurinia* (Fig. 3). Further webs were found within a 200-m radius. The larvae from several of these webs were small and massed together while those from other webs, particularly lower down the hillside, were larger. Some of the latter were found dispersed on grass stems as well as on their suspected food plant on which there was clear evidence of active feeding (Fig. 4).

On 2. v. six small larvae were found on the Stara Planina at the Golema Bridge, just above Crni Vrh, at altitude ca. 860 m. On 3. v. further webs were discovered in a damp meadow 7 km south of Kalna (Fig. 5). The

© Entomologischer Verein Apollo e. V., Frankfurt am Main

vegetation here was more advanced. By the road verge several dried-up specimens of a *Centaurea* species, presumably the previous year's growth, were discovered and photographed. Despite the wet conditions the larvae were very conspicuous and had a tendency to either congregate around their host plant (mostly within a silken web) or sit motionless on leaves of a *Centaurea* spp. They were exposed to the elements and predation, and if disturbed dropped to the ground. Some of the larvae were in an advanced instar. They had retained their black heads and bodies but they had developed a prominent lateral orange band and in appearance were similar to the larvae of *M. phoebe occitanica*. The site was revisited on 7. v. Despite sunnier, warmer conditions larvae were far less active and many had disappeared into their webs or into the undergrowth.

MG-P accompanied by Christopher Orpin revisited the Stara Planina region in early vii. 2011. Adults of *M. arduinna* were seen at various altitudes in the Babin Zub area from 500–1240 m. On 4. vii. a pair was observed in copula at an altitude of 505 m near the village of Mezdreja.

Author MĐ, accompanied by M. Popović and F. Franeta, visited Mt. Stol on 21. v. 2011 and found larvae in various instars, including some still in silken webs, at an altitude of 850 m. On 4. vi. they explored virtually unexplored territory in the very south of Serbia and in dry rocky terrain encountered two fresh ♂♂ of *M. arduinna*. This finding significantly increases the known distribution of the species within Serbia further southward.

Rearing report

Larvae were kept in plastic boxes and in netted pots containing various species of *Centaurea*. Confined to plastic boxes they readily accepted *C. phrygia*, *C. montana* L., *C. scabiosa* L. and *C. nigra* L. Larvae kept in netted pots thrived on growing plants of *C. phrygia* and *C. montana*. With additional warmth and an artificially-increased daylength they grew rapidly in size and by 12. v. the first larva had pupated. Larval feeding was mainly nocturnal. They showed very little basking behaviour. Mortality rate was very low.

Pairings

All the eggs proved to be infertile, indicating that all pairings were unsuccessful. MG-P released several ♂♂ and ♀♀ into a large flight cage containing plants of *C. phrygia* and cut flowers of nectar-rich plants. The flight cage was sited in various positions ranging from sunlit to shady situations. Although pairings were not observed, many egg batches were laid on the underside leaves of *C. phrygia* (Fig. 8). None of the eggs from any of the batches hatched. CW reports that egg-laying posturing was seen on 7–10 occasions in low light conditions with temperatures ranging between 25–35°C, but in full sunlight butterflies were noticeably inactive. Several egg batches of between 20–200 ova were laid on leaves of *C. nigra* and these all proved to be infertile. CL prepared two pots were both containing nectar-rich flowers and transplanted *C. phrygia* plants. Two 3–4 day old ♂♂ were introduced into each pot (the first 2 ♂♂ on 17. vi., the second on 19. vi.) and were allowed at least 24 h to settle in before a single fresh ♀ was introduced into each pot. All were very active but no pairings were observed.

Table 1: New records for *Melitaea arduinna* in SE Serbia.

Date	Location	Lat.	Long.	Stage	Approx. altitude	Observed by
3. vii. 2010	Stara Planina, Golema Reka	43°23.722′	22°36.296′	adult	1010 m	RV, MĐ
3. vii. 2010	Kalna, N edge of the town	43°24.704′	22°25.615′	adult	360 m	RV
4. vii. 2010	S of Kalna, Bigar Waterfall	43°21.294′	22°26.603′	adult	460 m	RV, MĐ
1. v. 2011	1.5 km NW of Cerova	43°19.173′	22°28.676′	larva	650 m	MG-P, CW, CL, C. Derry, D. Trew
2. v. 2011	Golema Bridge (above Crni Vrh), Stara Planina	43°24.296′	22°35.580′	larva	860 m	CL, C. Derry
3. v. 2011	7 km south of Kalna	43°21.007′	22°27.145′	larva	485 m	MG-P, CW, CL, C. Derry, D. Trew
21. v. 2011	Stol	44°10.371′	22°7.426′	larva	847 m	MĐ, M. Popović, F. Franeta
4. vi. 2011	Preševo valley, Miratovac	42°16.333′	21°39.033′	adult	550 m	MĐ, M. Popović
8. vi. 2011	Miljkovačka klisura	43°25.539′	21°51.947′	adult	353m	M. Popović
8. vi. 2011	Vratarnica	43°47.917′	22°18.038′	adult	165 m	M. Popović
13. vi. 2011	Babušnica	43°4.869′	22°22.248′	adult	674 m	D. Stojanović
17. vi. 2011	Golema Reka	43°24.374′	22°35.058′	adult	790 m	F. Franeta
18. vi. 2011	Rsovci	43°10.349′	22°46.686′	adult	673 m	MĐ, M. Popović
19. vi. 2011	Ravno Bučje	43°26.204′	22°33.618′	adult	797 m	MĐ, M. Popović, F. Franeta
20. vi. 2011	Južni Izvor	43°23.089′	22°19.971′	adult	685 m	MĐ, M. Popović
25. vi. 2011	Kalna	43°23.614′	22°23.151′	adult	474 m	F. Franeta
2. vii. 2011	Stara Planina	43°23.152′	22°35.507′	adult	1240 m	MG-P, C. Orpin
3. vii. 2011	2.9 km west of Jalovik Izvor, 5 km NW of Kalna	43°23.845′	22°22.054′	adult	555 m	MG-P, C. Orpin
4. vii. 2011	Stara Planina, Mezdreja	43°24.207′	22°31.304′	adult	505 m	MG-P, C. Orpin
5. vii. 2011	Rtanj, Jezero	43°34.088′	21°54.175′	adult	816 m	M. Popović

© Entomologischer Verein Apollo e. V., Frankfurt am Main

All four ♂♂ died by 23. VI. and both ♀♀ had expired by 26. VI. A few ova were observed spattered on the upper surface of a *Centaurea* leaf by the first ♀ but failed either to change colour or to hatch.

Ovum

Most of the ova were laid in large batches containing several hundred eggs but some batches were smaller and strung out and a few eggs were laid individually (Fig. 9). The ovum is yellow/green in colour, barrel-shaped, with vertical keels and a typical nymphalid depression at the apex (Fig. 10). After 5 weeks, and despite few eggs collapsing, it became apparent that all the ova were infertile.

Larva

In appearance post-hibernating larvae bear a close resemblance to *E. aurinia* larvae at the same stage of their development. Their web structuring and larval behaviour is also similar (Figs. 11–12). They have black heads and each body segment is covered in an irregular pattern of grey speckles (Figs. 3–4, 13). On average adult larvae grow to 30 mm in length prior to pupation. Their heads and bodies are black. Each segment is speckled grey and contains a white-ringed spiracle. The thoracic legs, prolegs, tubercles and spines are black. In advanced instars the most obvious development is the wide lateral orange band. On and below this band the tubercles are pale orange in colour (Fig. 14). Final instar larvae are similar to those of *Melitaea phoebe occitanica* and *Melitaea aetherie* (Hübner, 1826). In comparison to *M. arduinna*, larvae of *M. phoebe occitanica* usually have a narrower orange band and paler (often white) tubercles.

Pupa

A majority of the pupae were suspended by silken pads from the netting at the top of the cage. Compared to other European *Melitaea* species, the pupae of *M. arduinna* bear the closest resemblance to those of *Melitaea cinxia* (Linnaeus, 1758) (Figs. 15–16). By contrast, *M. cinxia* pupae are generally paler, the evolving wing pattern is clearly visible through the pupal casing (not evident in *M. arduinna*), and the dark spots on each segment contrast with their paler ground colour (all markings muted in *M. arduinna*). On average pupae took 10–14 days to hatch but some took as long as 17 days.

Adults

There was surprisingly very little mortality. As most of the larvae we collected were found exposed to all the elements, it was assumed that there would be a high rate of parasitism. However, none of the larvae that pupated produced a parasite. The first ♂♂ emerged on 28. v. (Fig. 17; see also Figs. 18–19), the first ♀♀ on 6. VI. (Figs. 20–21). Male forewing measurements (basis to apex) range from 20 mm to 24 mm with an average of 22.45 mm ± 0.83 mm s.d., female forewing measurements vary from 22 mm to 27 mm with an average of 25.01 mm ± 1.10 mm. There is variation in colour and markings in both sexes (Figs. 22–25). Females are extremely variable, with larger darker forms hatching at the end of the brood (Fig. 25).

We found that specimens of *M. arduinna* from Serbia are on average smaller than those from northern Greece. Specimens measured from Florina have male wing measurements ranging from 22–25 mm with an average of 23.38 mm ± 0.82 mm while females vary from 24.5–27 mm with an average of 26.08 mm ± 0.90 mm.

Food plant

The premature growth of the host plant discovered in Serbia resembled *Centaurea nigra* but as it grew in size it was evident that it was a different species (Figs. 6–7). Close-up photos of the leaf, stem and flower were sent to Božo Frajman (botanist and assistant professor at the Institute of Botany, University of Innsbruck, Austria) to be identified. He in turn passed on these images to his Serbian colleague Marjan Niketić (botanist and senior curator at Natural History Museum, Belgrade) who identified the species as *Centaurea phrygia*.

Conclusions

Melitaea arduinna was only recently discovered in Serbia and was considered extremely rare (Jakšić & Grozdanović 2007). Recent faunistic studies in eastern Serbia have provided many additional records and the species appears to be much more widespread than previously thought. This is certainly the case for the wider surroundings of Stara Planina where *M. arduinna* was found at almost all surveyed sites. The record from the Preševo valley indicates an even wider distribution of the species in Serbia. Although nothing is specifically known about their dispersal, when it comes to habitat requirements *M. arduinna* appears to be far less selective than previously thought (Jakšić & Grozdanović 2007, Székely 2008, Popović & Đurić 2010). Their presence in areas dominated by 'improved' meadows is particularly significant.

Larval webs were found to be widespread and in several areas in the Stara Planina area numerous. Larvae were discovered concurrently in various stages of development. They appeared inactive by day feeding mainly at night. Post-hibernating larvae massed together in large larval webs dispersing from their webs as they reached maturity. In the wild, larvae were only discovered on *C. phrygia* but in captivity accepted other species of *Centaurea*.

Acknowledgements

To Duncan Trew (Buckinghamshire, U.K.) and Charles Derry (Shropshire, U.K) for their assistance with field observations. To Božo Frajman and Marjan Niketić for helping to identify the host plant *Centaurea phrygia*. To Filip Franeta, Miloš Popović and Dejan Stojanović for providing additional unpublished field observations.

© Entomologischer Verein Apollo e. V., Frankfurt am Main

References

Abadjiev, S. (2001): An atlas of the distribution of the butterflies in Bulgaria (Lepidoptera: Hesperioidea & Papilionoidea). – Sofia (Pensoft), 335 pp.

Hesselbarth, G., van Oorschot, H., & Wagener, S. (1995): Die Tagfalter der Türkei unter Berücksichtigung der angrenzenden Länder, vols. 1-2. – Bocholt (Selbstverlag Sigbert Wagener), 1354 pp.

Đurić, M., Popović, M., & Verovnik, R. (2010): Jelašnica gorge – a 'hot spot' of butterfly diversity in Serbia. – Phegea, Antwerp, **38** (3): 111–120.

Jakšić, P. [ed.] (2008): Prime butterfly areas in Serbia. – Belgrade (HabiProt), 223 pp. [bilingual: Serbian/English].

Jutzeler, D., Gascoigne-Pees, M., Grillo, N., Tarrier, M., Villa, R., & Volpe, G. (2004): *Melitaea aetherie* (Hübner, 1826) de Sicilie et d'Afrique du Nord: nouvelles données écologiques, géonémiques et taxonomiques induites par un élevage de la souche sicilienne (Lepidoptera: Nymphalidae). – Linneana Belgica, Wetteren, **19** (9): 361–374.

Pamperis, L. N. (2009): The butterflies of Greece. – Athens (Editions Pamperis), 768 pp.

Popović, M., & Đurić, M. (2010): New findings of two rare nymphalids in Serbia (Lepidoptera: Nymphalidae). – Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, **31** (3): 169–172.

Schaider, P., & Jakšić, P. (1989): Die Tagfalter von jugoslawisch Mazedonien. – München (Selbstverlag Paul Schaider), 288 pp.

Székely, L. (2008): The butterflies of Romania. – Braşov oi (Brastar Print), 305 pp.

Tolman, T., & Lewington, R. (2008): Butterflies of Britain and Europe. – London (Harper Collins), 384 pp.

Tshikolovets, V. V. (2003): Butterflies of eastern Europe, Urals and Caucasus. – Kyiv, Brno (V. Tshikolovets), 176 pp., 47 pls.

Verovnik, R., Micevski, B., Đurić, M., Jakšić, P., Keymeulen, A., Van Swaay, C., & Veling, K. (2010): Contribution to the knowledge of the butterfly fauna of the Republic of Macedonia (Lepidoptera: Papilionoidea & Hesperoidea). – Acta Entomologica Slovenica, Ljubljana, **18** (1): 31–46.

Wiltshire, E. P. (1952): Early stages of Palaearctic Lepidoptera, X. – Bulletin de la Société Fouad Ier d'Entomologie, Cairo, **36:** 175–185.

Received: 16. iv. 2012

Entomologische Notiz

A further note on *Ochus subvittatus* (Moore, 1878) from South Thailand (Lepidoptera: Hesperiidae)

Dr. Peter V. Küppers, Sonnenbergstrasse 18, D-76228 Karlsruhe, Germany; kueppers_peter@web.de
Lamai Janikorn, 45 Moo 8, Ban Suanyai, Danbon Lam Plaimat, Buri Ram 31 130, Thailand

In 2008 the senior author reported *Ochus subvittatus* (Moore, 1878) (Hesperiidae) as new for Peninsular Thailand, where he found a big population of the "Tiger Hopper" near the village of Khiriwong in the southern part of the Khao Luang Mountain Range (Nakhon Si Thammarat Province).

In 2011 the authors observed this small butterfly at several opportunities near Ban Lam Kaen in the lower Ton Pring Valley (Khao Lak, Phang Nga Province, Amphoe Thai Muang) from the west coast of the Thai Peninsula at an elevation of about 25–30 m (8° 36′50,31″ N, 98°14′42,54″ E).

Fig. 1: *Ochus subvittatus* (Moore, 1878) auf *Wedelia biflora* (Asteraceae); 21. vii. 2011, Ton Pring Valley, Ban Lam Kaen, Amphoe Thai Muang, Phang Nga Provinz, S-Thailand.

Between 11. vii. and 21. vii. 2011 the skippers could be seen on the wing in open country around secondary growth, visiting flowers (mainly Asteraceae) or settling on leaves of grasses and low growing herbs. Usually they occurred at about 10:30 h and were on the wing until 13:00–13:30 h, when the butterflies slowly disappeared.

The population of *Ochus subvittatus* (Moore, 1878) is by far not so plentiful in Khao Lak as in Khiriwong and we presume that, while still spreading, small populations are going to be established at suitable places on the way southwards.

We hope to get more information about the butterfly during this year.

References

Corbet, A. S., & Pendlebury, H. M. (1992): The butterflies of the Malay Peninsula [4th edition, revised by J. N. Eliot]. -- Kuala Lumpur (Malayan Nature Society), 595 pp., 69 pls.

Ek-Amnuay, P. (2006): Butterflies of Thailand. Fascinating insects. English edition. Vol. **2.** – Bangkok (Amarin Book Center), 865 pp.

Eliot, J. N. (1985): Hesperiidae. – *In:* Kurian, E. J., (ed.), Butterflies in Thailand, Vol. **5.** – Bangkok (Brothers of St. Gabriel), 152 pp., 40 pls.

Fleming, W. A. (1975): Butterflies of West Malaysia and Singapore. Vol. 2. – Kuala Lumpur, Singapore (Longman Malaysia), Faringdon (E. W. Classey), 92 pp., 40 pls.

Küppers, P. V. (2008): *Ochus subvittatus* (Moore, 1878) neu für S-Thailand (Lepidoptera, Hesperiidae). – Atalanta, Marktleuthen, **39** (1–4): 276–277.

Received: 16. iv. 2012

© Entomologischer Verein Apollo e. V., Frankfurt am Main, Juni 2012 ISSN 0723-9912

© Entomologischer Verein Apollo e. V., Frankfurt am Main